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A.D. 1789 . . . . . N<sup>o</sup> 1689.

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S P E C I F I C A T I O N

OF

HENRY SEYMOUR CONWAY.

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APPLYING HEAT OF COKE OVENS TO  
GENERATION OF STEAM, BAKING  
BREAD, &c.

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CONWAY'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY SEYMOUR CONWAY, send greeting.

WHEREAS His most Excellent Majesty King George the Third, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twenty-third day of June, in the twenty-ninth year of His reign, did give and grant unto me, the said Henry Seymour Conway, His especial licence that I, the said Henry Seymour Conway, during the term of years therein expressed, should and lawfully might use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, my Invention  
10 of "AN ENTIRE NEW METHOD OF ADAPTING OR CONVEYING THE HEAT ARISING FROM THE FIRE OF COAL EMPLOYED IN COKE OVENS (BY A PARTICULAR CONSTRUCTION OF SUCH OVENS AND FLUES ADJOINING THERETO OR CONNECTED THEREWITH) FOR THE WORKING OF STEAM ENGINES, BAKING OF BREAD, MEAT, OR OTHER FOOD, CALCINING AND FUSING OF ORES AND METALS, MAKING OF BRASS OR STEEL, AS ALSO FOR THE PURPOSE OF  
15 WARMING OF ROOMS, STAIRCASES, OR LARGE BUILDINGS, HEATING WATER FOR BATHS, AND WHICH IS APPLICABLE TO MANY OTHER USEFUL PURPOSES, AND MANUFACTORIES REQUIRING THE ASSISTANCE OF FIRE OR HEAT, BY WHICH MEANS THE EXPENCE OF THE COAL OR OTHER FUEL WHICH HATH HITHERTO BEEN NECESSARY FOR THE ABOVE OPERATIONS IS ENTIRELY OR IN THE GREATEST PART SAVED;" in which said Letters Patent  
20 there is contained a proviso obliging me, the said Henry Seymour Conway, under my hand and seal, to cause a particular description of the nature of my said Invention, and how the same is to be performed, to be inrolled in His Majesty's High Court of Chancery within one calendar month after the date of



*Conway's Impts. in Conveying Heat for the Working of Steam Engines, &c.*

the said recited Letters Patent, as in and by the same, (relation being thereunto had,) may more fully and at large appear.

**NOW KNOW YE**, that in compliance with the said proviso, I, the said Henry Seymour Conway, do hereby declare that my said Invention is described in manner following, that is to say :—

In the variety of cases in which the above Invention and improvement may be employed according to the different purposes and situations, it would be impossible to describe them so minutely as to admit of no variations, but the general principle being adhered to, it will be sufficient to furnish such a description as may make the utility and practicability of them for the different purposes or the most material ones to which they may be applied clearly understood. 1<sup>st</sup>, in working steam engines, the coal being spread on a flat or dead hearth, as is usual in coke ovens, and being surrounded and covered over with an arch or crown of brickwork, formed so as well to contain and reverberate the heat, the proper openings must be made or left in the crown or the search through which to convey the flame and heat of the coal while it is burning, to be charr'd or made into coke, so as to give heat to the boiler employed sufficient to raise the steam necessary for working the engine to which it is to be adapted, according to the size of its cylinder and force required, and to this the size of the oven, as well as the flues or openings, must be adapted. These openings may be of different forms, having the necessary number of square inches as a vent for the flame and heat, and may be variously placed, according to the position and form of the boiler, but by different experiences and trials are thought generally best when made in the backward part of the oven; the draft being apparently brisker and the flame being conveyed under the bottom of the boiler in such a stream or body as may give the necessary heat, it should be drawn round the boiler in one or more flues, according to the shape of the boiler and height of water. Where the latter is not considerable it may be sufficient to fill the space under the boiler with flame, and then carry it off to the chimney, or direct it to any other purpose, taking care that the flues or openings from under the boiler be so framed as not to carry off the flame by too quick a draft, which, besides a due size given to such flues, should be farther governed by registers placed therein, so as to check the draft at pleasure, by that means either keeping a full body of flame under the boiler, or increasing its activity by a brisker draft, which may be varied according to the different states of the fire. When the heat is to be given to ovens for the purpose of baking bread or biscuit, or for pies or meat, or any other kind of things to be dressed or baked in ovens, the flame or heat must then be conducted so as to heat all parts of the said baking ovens, whether placed over the coke ovens



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or in the back, or in any other direction sufficiently contiguous. For this purpose flues are to be formed under the bottom of the baking ovens in such manner as to disperse the heat as near as may be equally to the different parts, carrying it from the bottom by a circular flue each way round the search or  
5 sides, from whence it rises to give heat in the same way over the top, making the brickwork in each part of a thickness calculated to give the requisite warmth without burning, for which end it should be made somewhat thickest under the bottom where it comes first from the coke oven, and thinnest over the crown, where it may have lost something of its force. An oven or machine  
10 for baking biscuit on this plan has been erected and worked, by which three baking ovens are heated from the fire of the same coke oven, one of them being placed immediately over, and the two others behind the same coke oven, on a level with it, and as near as they could stand to each other at equal distance from it; the flame for heating the two last issuing from the back of the coke  
15 oven, and that for the first rising by flues or openings through the crown, all the said openings from the coke oven being governed by registers between the coke and baking ovens, so as that the flame may be shut off from any or all of them at pleasure; to which are also added other registers in the chimney flues, to damp or check the heat, and detain it more or less in its circulation  
20 round the several baking ovens respectively. The baking ovens may also be heated by the admission of the flame from the coke oven into them through a large opening for as long time as may be necessary to give the proper heat. The mouth may at the same time be closed, and only a smaller opening or flue left sufficient to carry off the flame and to keep the body of the oven full, as in  
25 reverberating furnaces; those small openings may also be governed by registers; it should, however, be observed not to admit the flame till the fire in the coke oven is become clear; the said opening from the coke oven being afterwards closed by a register, the heat will then remain equal or diminish gradually, as in the common way of heating ovens by faggots, &c., and in this manner two  
30 or more baking ovens may be heated alternately from the same coke oven, and the process continually repeated. When metals are to be calcined or melted a furnace adapted to those purposes is placed contiguous to the coke oven, from whence the flame should be conveyed immediately through large openings and in as full a body as may be, with this caution, that in melting the fire should not  
35 be suffered to pass into the furnace (being shut off by registers) till the sulphur and smoke of the coals is past off, and the flame appears bright and clear; in all cases the chimney should be raised to a considerable height, as of thirty or forty feet, or more, as is common for furnaces, in order to command a quick draft, which may be constantly restrained by the registers as above described.



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This Invention has (as may appear in part from what has been said) the peculiar property and advantage that the same oven may at the same time be applied to several different purposes, or that two or more coke ovens may be so placed as to be applicable to one and the same purpose, as in the case of steam engines, or of some metallic processes where a great force of fire is required. 5

And in steam engines the steam may be acquired either from two or more different boilers, or the heat of the different coke ovens applied to single boilers of an extraordinary dimension, and at all such forges where the price of coal is any way considerable, and the demand of coke great, this method seems to offer the highest advantages. Another particular in these constructions, of 10 singular advantage in many cases, is the readiness with which they may be made to turn off the fire and to cool, for in those not only double registers may be used immediately to shut off the flame, but also air holes placed between those registers to be opened like them at pleasure, as well as other air holes also to open between the crown of the coke oven and bottom of the boiler, 15 or into the circular flues, if desired, which will prodigiously quicken the cooling, and which, being afterwards stopt with bricks or plugs well adapted, and luted, where necessary, will render the alternate admission and exclusion of the air compleat, and will have the farther advantage of making openings to clear the different flues occasionally. When the purpose to be served 20 is that of warming houses or staircases, the oven may either be placed in some convenient spot joining to the wall of the house, and the flame or heat drawn from it into flues within properly disposed to receive and conduct it, or the body of the oven may be placed within the house, covered, as stoves often are, in such manner for convenience or appearance as may be thought best, which 25 may be the more easily done, as coke ovens of a moderate or even small size are found to give heat so as to produce very considerable effects. The heat or flame being conducted through the flues, as before mentioned, to the places to be warmed or heated, may be used for different domestic or other purposes; an oven of this kind, of no more than three feet diameter and one and a half feet in 30 the height or little more, having been experienced to keep a boiler containing seventy-two gallons of water constantly boiling, so as to evaporate nine gallons per hour, and to work at the same time a small still, and sometimes to calcine or melt both copper and iron. It may be useful to mention that registers much exposed to the immediate heat of the fire should be made of the best Stour- 35 bridge or other strong loom or brick earth, or of a composition of such loom and old burnt ware from glass-houses, &c. pounded, or other like composition. In other parts they may be conveniently made of iron of different thickness, according to the different distances from the fire. It has also been found useful



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where the heat is very great to have the iron handles used for drawing the loam or composition registers so fixed by holdfasts in holes made in the registers for that purpose, that no part may be exposed to the great impulse of the fire, but defended by the brickwork. It may also be found  
 5 useful, where the registers are of extraordinary size, to make them a little of a wedge form, narrowing towards the end, in order to their drawing or lifting with ease, the grooves in which they run being made in the same form, so as to shut well when closed.

10 In witness whereof, I, the said Henry Seymour Conway, have hereunto set my hand and seal, this Twentieth day of July, One thousand seven hundred and eighty-nine.

H. S. CONWAY. (L.S.)

15 **AND BE IT REMEMBERED**, that on the Twentieth day of July, in the year of our Lord 1789, the aforesaid Henry Seymour Conway came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And also the Specification aforesaid was stampd according to the tenor of the Statutes made for that purpose.

20 Inrolled the Twenty-third day of July, in the year of our Lord One thousand seven hundred and eighty-nine.

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